TYPICAL DESIGNS FOR PICK-UP BUS STOPS ON RURAL (i.e. NON-URBAN) HIGHWAYS

(First Revision)

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TYPICAL DESIGNS FOR PICK-UP BUS STOPS ON RURAL (i.e. NON-URBAN) HIGHWAYS

1. INTRODUCTION

1.1 Buses standing indiscriminately on the carriageway to drop or pick-up passengers can seriously affect the capacity of the roadway, besides being a cause of accidents. Safe, adequate and accessible infrastructure is the guiding principle for policy perspective on mobility for all citizens including women, elderly and disabled. It becomes imperative on rural highways characterized by two-lane two-way roads, low volume traffic, and high speeds. It is, therefore, desirable that on all non-urban highways, consideration should be given to the construction of bus lay-bys of suitable design at required locations to ensure orderly movement of the through traffic and safe access/egress for the commuters.

1.2 Primary elements of design to be considered are bus stop location, lay-by and kerb design, markings and passenger amenities. Recognizing the need for a standard on this subject, the Specifications and Standards Committee has evolved the typical designs given herein covering the siting and layout of wayside pickup bus stops, and these are recommended for general adoption.

1.3 IRC:80-1981 "Type Design for Pick-up Bus Stops on Rural (i.e. Non-Urban) Highways" was first published in December, 1981. The work of revision of this document was taken up by Transport Planning and Traffic Engineering Committee (H-1) of the Indian Roads Congress in May, 2018. A subgroup consisting of Dr. K. Ramachandra Rao as Chairperson and Dr. Sewa Ram as member was constituted to revise the document. Dr. Geetam Tiwari, Dr. Manoj M., Dr. Amit Sharma and Dr. Sandeep Gandhi were involved as co-opted members of the subgroup. The revised draft prepared by the subgroup was deliberated in a series of meetings and was finalized in its meeting held on 29.05.2020.

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Transport & Highways

The revised draft document was placed before the Highways Specifications and Standards Committee (HSS) in its meeting held on 12.09.2020 and continued on 19.09.2020 & 03.10.2020. The HSS Committee decided that the Convenor, H-1 Committee will modify the document based on written and verbal comments offered during the meeting and submit the final document to IRC for placing before the meetings of Executive Committee (EC) and Council. The EC in its meeting held on 18.02.2021 approved the draft document for placing before the Council. The 221st Mid-Term Council in its meeting held on 20th – 21st February, 2021 considered and approved the draft revision of IRC:80 "Typical Designs for Pick-up Bus Stops on Rural (i.e. Non-Urban Highways)" for printing.

2. SCOPE & DEFINITIONS

2.1 The standard applies essentially to wayside bus stops in non-urban locations meant for quick loading and unloading of passengers. This code also deals with the bus stops located on dedicated bus lanes and in the vicinity of grade-separated or elevated roads. It however does not deal with more elaborate bus depots or terminals which are sometimes provided by the side of the road between the cities.

2.2 Regarding the design of on-street bus stops in urban or sub-urban situations, reference may be made to IRC:70 "Guidelines on Regulation and Control of Mixed Traffic in Urban Areas".

2.3 Section 3 deals with the categories of roads and bus stop typologies. This section provides a reference matrix and guidelines for location of bus stops on rural highways. Categories of the roads included are namely, National Highways (NH with 2-Lanes and more than two lanes), State Highways (SH with 2-Lanes and more than two lanes), Service roads provided near the elevated sections of the road, Major and other district roads (MDR/ODR), Village roads and Hilly roads.

2.4 Section 4 deals with the general principles of location of bus stops. Each placement type (Near-side/Far-side/Mid-block) has its own advantages and limitations. Generally each bus stop needs to be evaluated individually to decide its final location as per the local context.

2.5 Section 5 deals with the need for lay-bys and guiding principles. Various categories of roads warrant different layout of the lay-bys and respective traffic calming measures. Typical layout of lay-bys for 2-lane, 4-lane and 6-lane highways are also elaborated upon.

2.6 Sections 6 to 8 deals with guidelines for paving of lay-by area, drainage and markings. The scope of this code is limited to geometric design of lay-bys and guidelines for location only. Hence, construction aspects and materials to be used for the same have not been addressed. Along with these general guidelines specific references may be made to the relevant IRC codes mentioned in the text. Section 9 deals with the typical design of the bus shelter, however, size and design of the shelter may depend upon local conditions, availability of the materials and affordability and hence may be dealt within that context.

2.7 Definitions

Near-side (NS) bus stop: Bus stop located immediately before an intersection.

Far-side (FS) bus stop: Bus stop located immediately after passing through an intersection.

Bus lay-by: A strip of road by the side of main carriageway where buses can stop without interrupting the traffic stream.

Kerb-side: Kerbs define the boundary between the carriageway and adjacent areas and can have an important function concerning drainage or structural support of the carriageway. A bus stop located adjacent and aligned to the kerb is referred to as a kerb-side bus stop.

Important Note: The drawings included in the document may not be to the scale, only written dimensions are to be followed.

3. CATEGORIES OF ROADS AND BUS STOP TYPOLOGY

3.1 Different categories of roads have peculiar challenges for the bus stop location. The decision to provide lay-by or kerb-side bus stop may be made with reference to the matrix developed **(Table 1)**. Low-volume and high-volume in the context of rural highways relate to the Level of Service on these roads. A level of service and traffic volume upto level 'B' and is referred to as low-volume. The roads having traffic volume and level of service above level 'B' is taken as high-volume. A reference may be made to IRC:64 "Guidelines for Capacity of Roads in Rural Areas". In case of the NHs, wherever possible, lay-by should be provided for all the bus stops owing to the high traffic speed and volume of traffic they carry. Similarly, in case of state highways, wherever the RoW is available and shoulders are provided, it is advisable to provide lay-bys. However, in case of major district roads and other village/rural roads kerb-side bus stops may be provided.

3.2 Locating a bus stop Near-side (NS) or Far-side (FS) is based on local conditions/traffic volume/availability of RoW etc and hence needs to be assessed individually. It is recommended that lay-bys should be provided in case of NH (≥4-lanes) and NH (2-lanes with shoulders). State Highways (SHs) having similar characteristics to NH are treated likewise. However, SH without shoulder are to be provided bus stops on the kerb-side. Other categories of roads e.g. MDR/ ODR may be provided with painted pedestrian crossings and kerb-side bus pick-up facility. Hill roads may have valley-side bus stops on kerbs, although provision for lay-by may be made wherever space is available to avoid disturbing the through stream of traffic. Important aspects of traffic calming measures and specific requirements for different categories of roads are also dealt with in the matrix. 2-lane undivided NH/SH are recommended to have raised pedestrian crossings before the lay-by/kerb-side bus stops along with rumble strips as per the IRC:99-2018. 4-lane and 6-lane NHs are recommended to have transverse bar markers (TBMs) at specified distances before the start of lay-by only owing to the high speed of traffic. The layouts provided in Section 5 may be referred for further details.

Table 1 Different Categories of Rural Roads and Bus Stop Location

Roads/Location		Intersection		Mid-Block	
		Kerb-side	**Lay-by**	**Kerb-side**	**Lay-by**
NH (≥4-L)/SH (≥4-L)			Low Volume - NS High Volume - FS Painted Crossing + Bar Markers		Painted Crossing + Bar Markers
NH (2-L)/SH (2-L)	With Shoulder		Low Volume - NS RS + Raised Crossing		RS + Raised Crossing
			High Volume - FS RS + Painted Crossing		
	Without Shoulder	Low Volume - NS RS + Raised Crossing		RS + Raised Crossings	
		High Volume - FS RS + Painted Crossing			
Service Road on NH/Express-ways#		Raised Crossing		Raised Crossing	
MDR/ODR		Low Volume - Painted High Volume - Bar Markers		Low Volume - Painted High Volume - Bar Markers	
Village		Painted		Painted	
Hill Roads	NH				Painted Crossing + Bar Markers RS + Raised Crossing
	MDR/ODR			Painted (Valley Side)	

#NS- Near-side, FS- Far-side, RS-Rumble strips, Low-volume and high volumes refers to the traffic flow at LoS of 'B' and above LoS 'B' respectively.

"Painted" crossing and the "Raised" crossings in the table refer to pedestrian crossings.

4. GENERAL GUIDELINES FOR LOCATING A BUS STOP

4.1 The governing considerations when locating pick-up bus stops are minimum interference to the through traffic, increased overall safety, commuter comfort, and provisions for street vendors and other support activities.

4.2 Usually the bus stops should be sited away from bridges and other important structures, also from embankment sections which are more than three meters high. As far as possible, these should not be located on horizontal curves or at the top of summit vertical curves. Moreover, the need for good visibility all-round corresponding to safe stopping sight distance should be kept in view.

4.3 Bus stops should be located close to the road intersections. A stop within 30-50 m from the tangent point of intersection to start/end of the lay-by is desirable, particularly at junctions with main roads. This is advised to ensure commuter comfort and compliance owing to following assertions addressing the safety concerns relating to pedestrians and bus commuters;

(a) Acceleration of the bus from bus stop/lay-by to the intersection would result in lower speed of bus while approaching the intersection.

(b) A distance of 300-500 m from the intersection would effectively make the bus-stop very similar to mid-block location forcing commuters to cross the roads at mid-blocks rather than at the designated crossings near the intersections. This increases risk to pedestrians by increasing exposure to high speed traffic.

(c) A distance of 30-50 m from the intersection facilitates smooth interchange to different directions by reducing the walking distance to the intersection for the commuters.

(d) Also, in case of high-volume roads, when the bus stop is located on the Far-side, the intersection crossing provides required deceleration distance and avoids additional delays.

Hence, the location of a bus stop near intersection is recommended to be kept 30-50 m to ensure the safety of both commuters and pedestrians. In other cases, the distance may be relaxed to a certain extent giving considerations to the local conditions. However, if a substantial volume of buses were to turn right at the intersection, it is advisable to provide a far-side bus stop.

4.4 Locating a bus stop on far-side or near-side is to be decided based on local site investigation, land use and traffic volume. It is advisable to have the bus stop located on the far-side in case of high traffic volume though near-side bus stop may be provided in case the traffic volume is low. **Figs. 1** to **4** provide the details of near-side (lay-by and kerb-side) and far-side (lay-by and kerb-side) pick-up bus stops on major four-way intersections. Wherever possible, locating a bus stop on the far-side is preferred due to following advantages;

(a) Minimizes conflict between right turning vehicles and the bus.

(b) Minimizes sight distance problems on approaching an intersection.

(c) Encourages pedestrians to cross behind the bus.

(d) Shorter deceleration distance as intersection may be used to decelerate.

(e) Better access for commuters approaching bus stops from different roads converging on intersection.

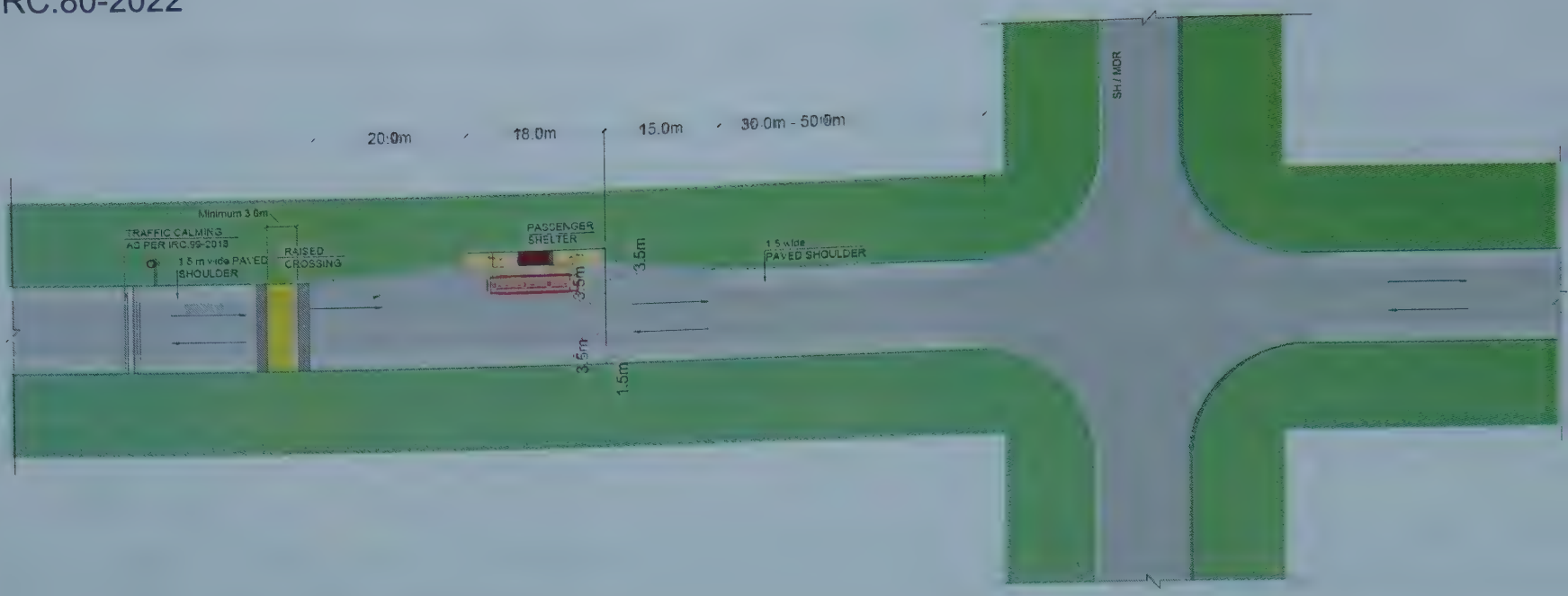

Fig. 1 Near-Side Bus Stop with Lay-by on a Major Four-Way Intersection

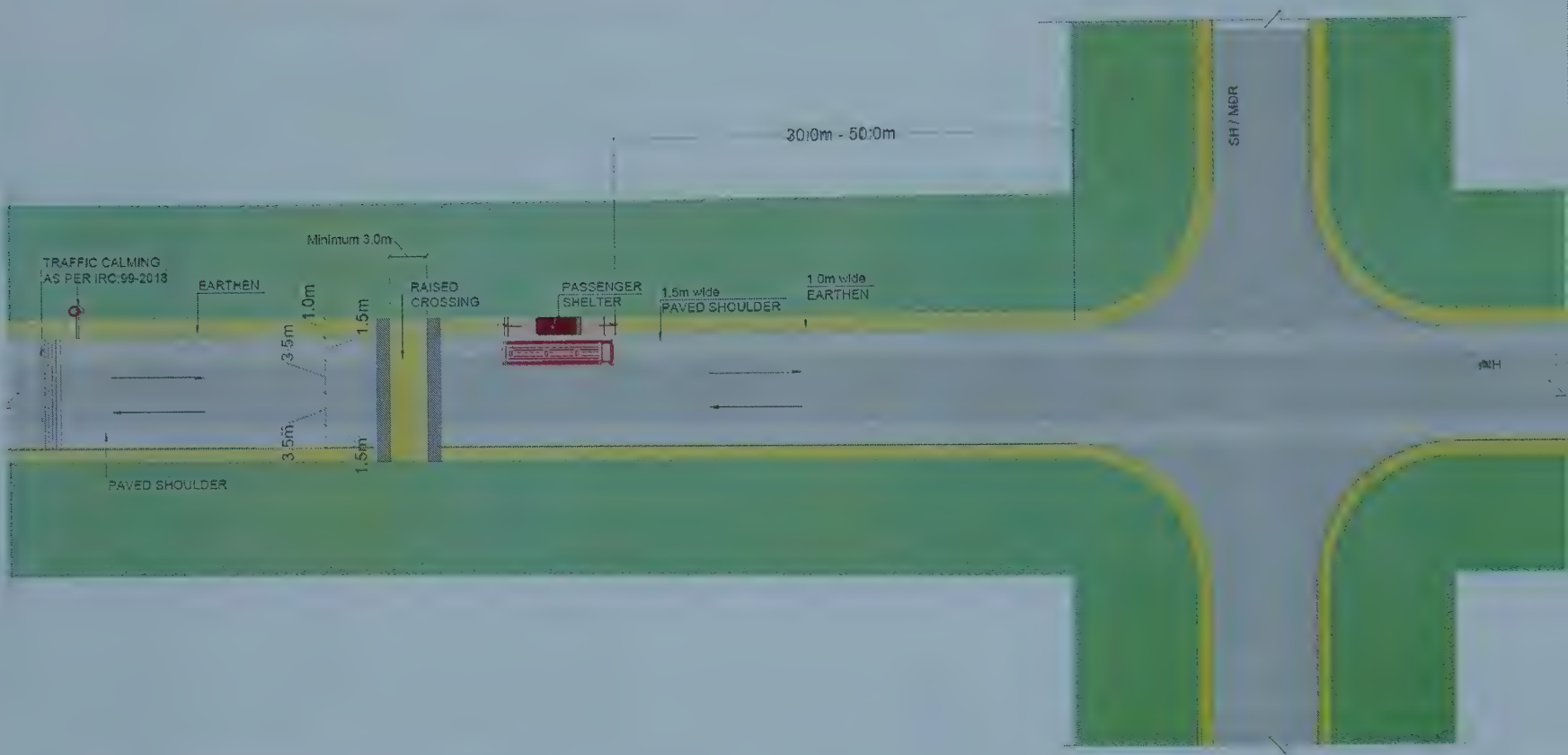

Fig. 2 Near-Side Bus Stop without Lay-by (Kerb-Side) on a Major Four-Way Intersection

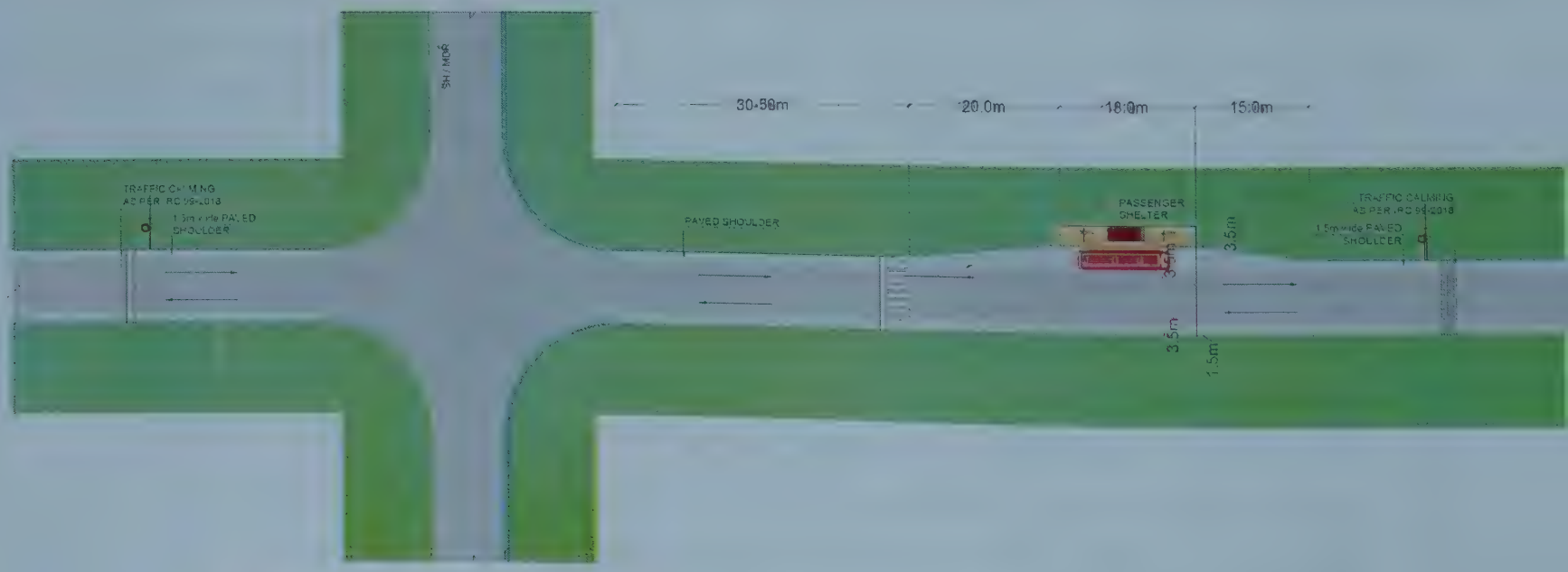

Fig. 3 Far-Side Bus Stop with Lay-by on a Major Four-Way Intersection

Fig. 4 Far-Side Bus Stop without lay-by (kerb-side) on a Major Four-Way Intersection

4.5 In case the acceleration/deceleration lanes are provided at the intersection, it is suggested that the deceleration lane leads to the bus stop hence the bus stop location remains as suggested earlier. At major four-way intersections involving the transfer of a substantial number of passengers from one pick-up stop to the other, it might be desirable to construct a single, composite bus stop of suitable design to cater to all the bus routes collectively.

4.6 In hilly areas, the bus stops should preferably be located where the road has straight alignment on either sides, gradients are flat and the visibility is reasonably good (usually not less than 50 m). Subject to these conditions, it is advisable to choose locations where there is a possibility of widening the roadway for accommodating bus lay-bys, passenger shelters, etc.

4.7 For hilly areas where there is a general constraint on space, a simple layout indicated in **Fig. 5** may be adopted.

Fig. 5 Kerb-Side Bus Stop for Hilly Roads

5. LAYOUT FOR LAY-BYS

5.1 The need for lay-bys on a particular road will depend on factors like the volume of traffic, frequency of buses stopping to pick-up passengers, duration of halt at bus stops etc. However, higher traffic speeds on rural highways makes it desirable to move the bus out of the main traffic stream in the interest of road safety.

5.2 Normally, provision of separate lay-bys is justified on all important trunk routes such as National Highways and State Highways, when:

(a) The volume of traffic is such that through traffic movement will be unduly disturbed by buses stopping on the carriageway.

(b) Buses are required to halt at a particular stop for a considerable time for rest or loading/unloading of passengers and goods; or

(c) The road is passing through a relatively congested locality like a village or a small town where besides waiting passengers the roadway is occupied by local traffic as well. So, there is a spillover of activities and there are multiple sources of traffic generation along the road.

(d) The road is a high-speed expressway or any designated highway, the main traffic stream should remain unobstructed as far as possible.

As a general principle bus lay-bys are to be provided everywhere possible. Kerb-side bus stops are suggested only in those cases where the land required for lay-by is not available as explained through the **Table 1**.

5.3 Usually, bus lay-bys may not be required on lower category roads like Other District Roads and Village Roads where traffic is comparatively low and not many buses ply on the route. Lay-bys are preferred on all locations, however, the provision for kerb-side stop is included to accommodate the conditions where enough right-of-way is not available. Especially in case of ODRs, Village Roads and Hill Roads without provision for shoulders. As these roads have lower design speed compared to 4-lane/6-lane roads and lower traffic volume compared to NH/SH. However, from safety considerations it may be desirable to provide separate lay-bys at the bus terminal points.

5.4 Regarding the traffic calming measures to be adopted while providing a kerb-side bus stop the reference may be made to IRC:99 "Guidelines for Traffic Calming Measures in Urban and Rural Areas".

5.5 Lay-by layout details as envisioned are different for various categories of rural highways. **Figs. 6, 7** and **8** provide the layout details for highways with 2-Lanes, 4-Lanes and 6 or more lanes.

5.6 A typical layout for bus stop lay-by for 2-lane highways is shown in **Fig. 6**. It is suggested hat along with the traffic calming measures a bus stop with lay-by may be provided. IRC:SP:73 also provides bus bay layout for 2-lane highways, however, relevant traffic calming measures are not included. Further it is recommended to include a raised/table-top pedestrian crossing along with the relevant traffic calming measures as per IRC:99. The total length of lay-by in his case may be restricted to 53 m. Bus bay size of 18 m is recommended for 2-L highways. However, in cases where multiple buses are to be facilitated, bus bay size may be increased in multiples of 18 m for each additional bay.

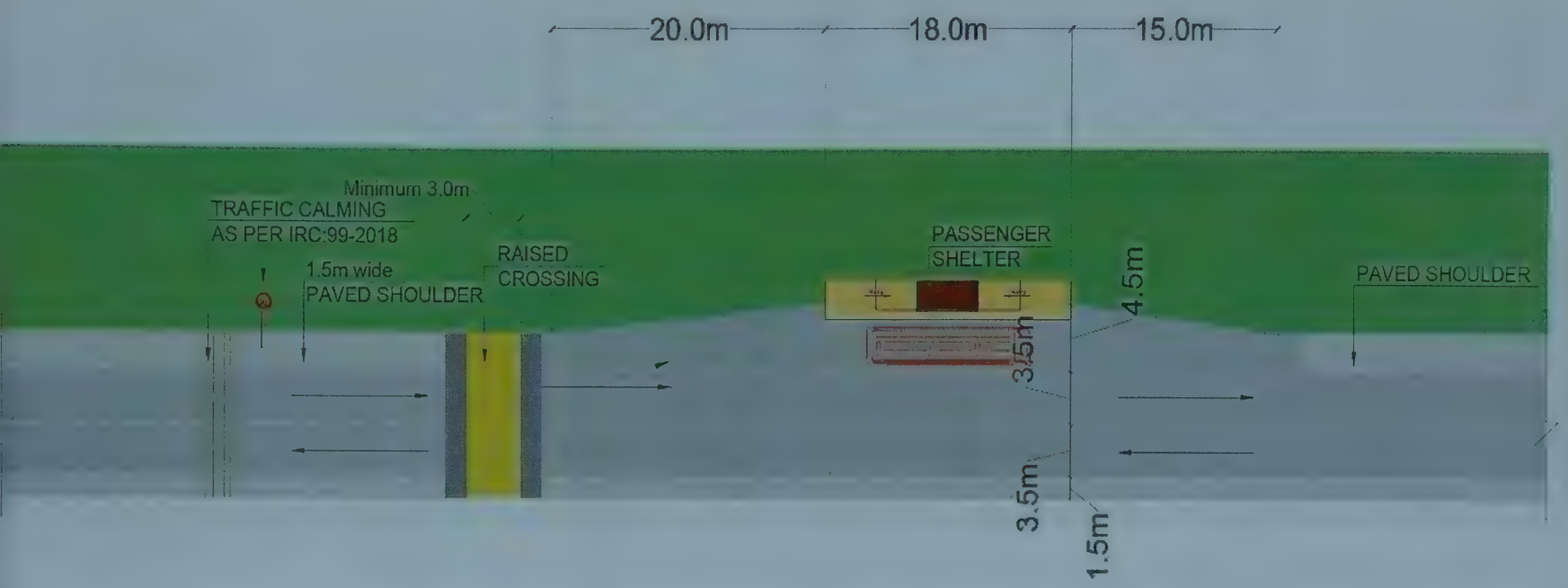

Fig. 6 Bus Stop with Lay-by for a 2-Lane Rural Highway

5.7 Typical layout for bus stop lay-by for 4-lane highways is provided in **Fig. 7**. IRC:SP:84 also provides bus bay layout for 4-lane highways, however, relevant traffic calming measures are not included. Due to higher entry speeds, more clear space for lateral movement is required on the approach to a bus stop than on the departure side. These requirements apply equally to whether the lateral movement of the bus is due to entering a bus bay or accessing a stop between parked cars. Typical entry tapers are in the order of 1:12 with length of 60 m, and exit tapers in the order of 1:5 with length of 25 m. The overall length of lay-by would be 103 m with 18 m bus bay. However, in cases where multiple buses are to be facilitated, bus bay size may be increased in multiples of 18 m for each additional bay. As a common principle, Bus shelter should be placed starting at the earthen shoulder. However, attempt has been made in case of lay-bys to ensure the provision for lay-by can be made within the available RoW in cases where additional land required is not available. Traffic calming measures adopted in this case are painted bar markers/TBMs of 10 mm thickness at a distance of 100 m and 250 m before the start of lay-by. It is recommended that half-elevated roads with underpass are provided in case of greenfield highway projects and where pedestrian volume and traffic volume is expected to be high. However, level pedestrian crossings/foot-over-bridges may be provided depending upon local site conditions.

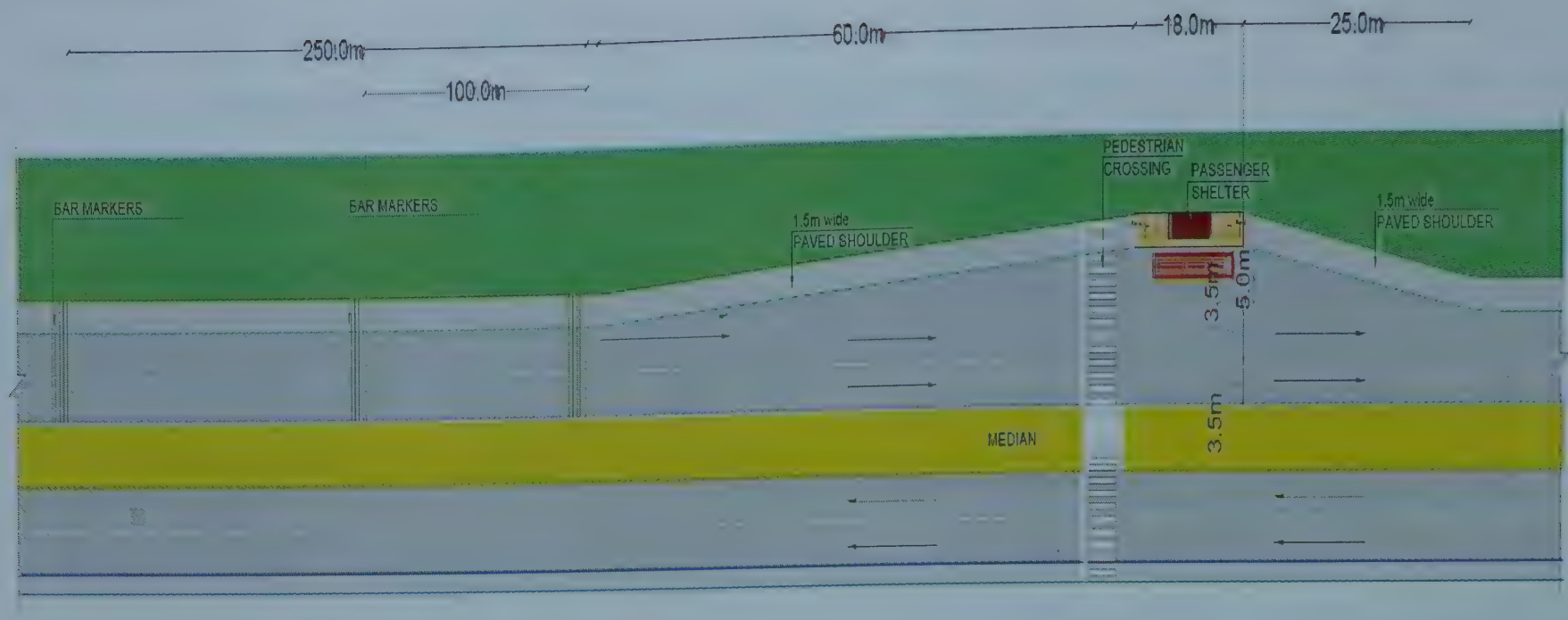

Fig. 7 Bus Stop with Lay-by for 4-Lane Rural Highway

5.8 A typical layout for bus stop lay-by for 6-lane highways is provided in **Fig. 8**. IRC:SP:87 also provides bus bay layout for 6-lane highways, however, relevant traffic calming measures are not included. These requirements are similar to the 4-lane highways. Traffic calming measures adopted in this case are TBMs of 10 mm at a distance of 100 m and 250 m before the start of lay-by. It is recommended that half-elevated roads with underpass are provided in case of greenfield highway projects and where pedestrian volume and traffic volume is expected to be high. However, level pedestrian crossings/Foot-over-bridges may be provided depending upon local site conditions. Additionally, a traffic island of width 1.8 m as indicated in **Fig. 8** with a recess of 1 m from the lane marking for the 3rd lane is also introduced to segregate the Buses from high-speed traffic stream. This helps in providing staged pedestrian crossing to account for the increased width of the road owing to the provision of a third lane. All of these layouts are illustrated to accommodate a single bus bay. Length of bay shown in **Figs. 5** to **7** may be 18 m long, this can however be increased in multiples of 18 m if more than one bus is likely to halt at the pick-up stop at one time.

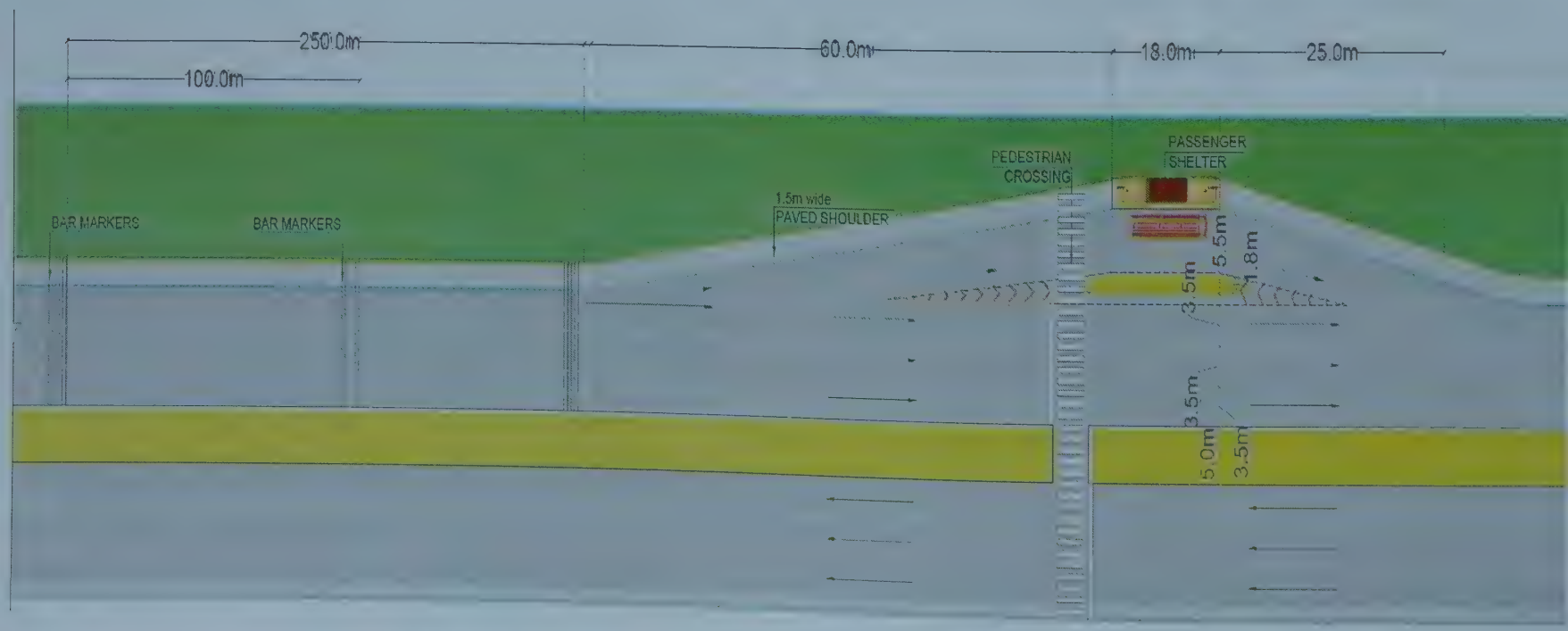

Fig. 8 Bus Stop with Lay-by for 6-Lane Rural Highway

5.9 The selection of layout at a particular location should be based on local factors like the number of buses stopping at a time, the period of halt, volume of traffic on the road, number of passengers alighting at the bus stop etc. To determine the layout required, a careful study of various factors may be made in consultation with the bus transport operators.

5.10 Normally the bus stops should be provided on both sides of the road for each direction of travel independently so that the buses do not have to cut across the road. Bus stops on opposite sides should be staggered to a certain extent to avoid undue congestion on the highway (**Fig. 9**). At intersections, it may be preferable to locate the bus stops for up and down directions on farther sides of the intersection as shown in **Fig. 3** and **4**.

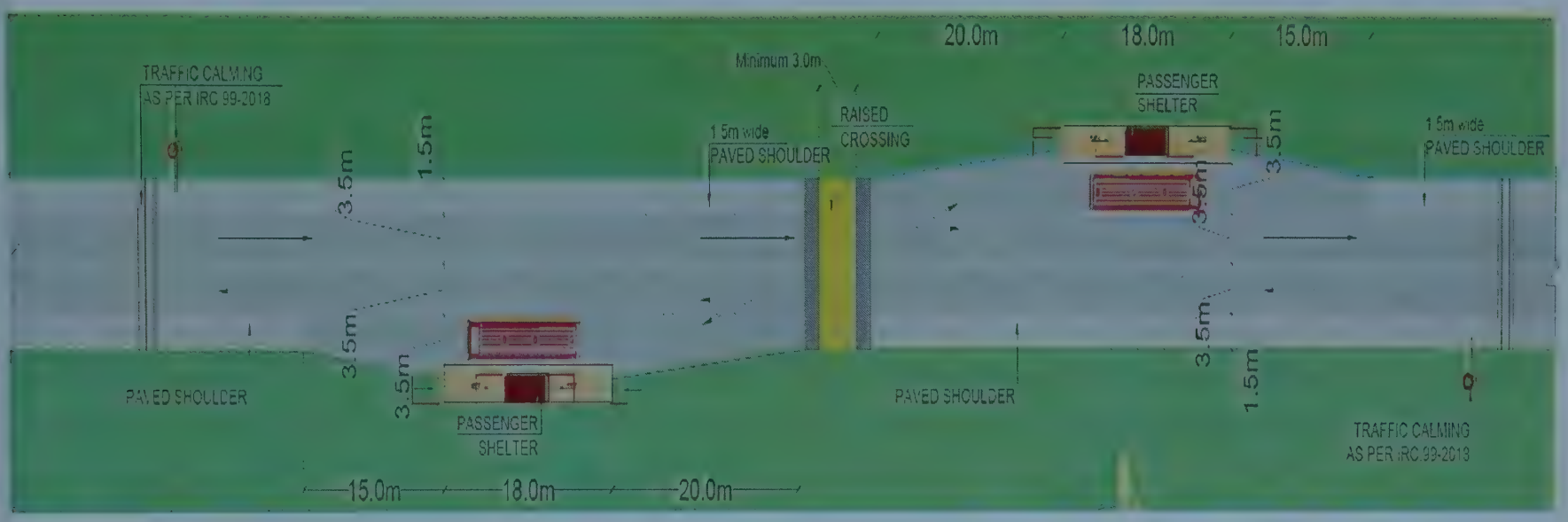

Fig. 9 Staggered Pick-up Bus Stops on 2-Lane Rural Highway

5.11 Ordinarily no structure other than passenger shelters be permitted at the bus stops. The shelters should be structurally safe and aesthetic in appearance, while also being functional so as to protect the waiting passengers adequately from sun, wind and rain. If a shelter is constructed on the hill side, slopes should be appropriately dressed and suitably protected to avoid slips. The shelter should be set back from the kerb line by at least 0.25 m.

5.12 On important bus stops, temporary type of toilet facilities with necessary arrangements for disposal of effluents (for instance with the help of soak pits) may also be provided close to the road land boundary away from the passenger shelters. It is recommended that pick-up bus stops on highways having multiple bus bays may be provided with toilet amenities. With regards to the toilet amenities to be provided at the identified bus stops, a reference may be made to the Swachh Bharat Mission Guidelines (Urban), 2018.

6. PAVING OF LAY-BY AREA

6.1 The pavement in the lay-by area should have an adequate crust concerning the wheel loads expected. Also, the surfacing should be strong enough to withstand forces due to frequent breaking and acceleration by the buses. The colour and texture of the lay-by surfacing should be preferably distinctive from that of the main carriageway. It is recommended that the paving in the lay-by area should be done with 100 mm thick paver blocks.

6.2 Shoulders close to the lay-bys should be paved to some distance to permit parking of occasional vehicles and facilitate drainage. Brick-on edge; lean cement concrete, lean cement-fly ash concrete and lime-fly ash concrete either cast-in-situ or precast; precast tiles; stone slabs/ blocks; water-bound macadam with surface dressing etc., are some of the materials which could be considered for this purpose. For a more durable construction, the shoulders near Bus-Stops should be constructed with bituminous pavement with WMM subbase topped with DBM and BC layers. Paved shoulders should be flush with the surface of the adjoining carriageway and slope away from it to enable drainage. Where the pavement and the shoulders are of the same colour, it would be preferable to provide edge lines at their junction in accordance with IRC:35 "Code of Practice for Road Markings" (with paints).

7. DRAINAGE

7.1 Lay-bys for pick-up bus stops should have proper cross slope to drain off the excess water. Water which is likely to splash on the waiting passengers should be allowed to be collected near the bus shelters.

7.2 Along all kerbed edges it will be desirable to provide a suitable kerb-gutter section with requisite longitudinal slope and outlets at intervals to ensure quick disposal of water. Detailed guidelines on provision of drainage facilities can be found in IRC:SP:42 "Guidelines on Road Drainage".

8. ROAD SIGNS AND MARKINGS

8.1 Road signs and road markings at or near the bus stop provides guidance for safe and efficient operation of the facility. All the signs and marking shall be as per the recommendations provided in IRC:67 "Code of Practice for Road Signs" and IRC:35 "Code of Practice for Road Markings". Illustrations for essential road signs and markings are shown in **Figs. 10, 11** and **12**.

Fig. 10 Road Signs and Markings on 2-Lane Undivided Highway

8.2 The following important points are to be considered during the placement of traffic signs for the proposed designs provided in Section 4.

- Signs related to Give Way to Buses regulatory sign, bus way/bus only compulsory direction control sign and bus lane, bus stop facility information signs shall be placed on the appropriate location as mentioned in IRC:67 "Code of Practice for Road Signs".

- The bus stop infrastructure coupled with pedestrian crossing facility like zebra crossing, speed table/raised pedestrian crossing or grade separated facilities shall be informed to the road used well in advance using the road signs and marking as explained in respective codes mentioned above.

- Provision of median opening, if any, provided for the crossing facility of pedestrian also to be highlighted with object hazard marker or delineator as recommended in IRC:79 "Recommended Practice for Road Delineators", so that these opening should not become a hazard to pedestrians and motorized commuters at night or in bad weather conditions.

- The siting of signs should be as per the guidelines provided in IRC:67 "Code of Practice for Road Signs".

- As recommended in IRC:SP:117, directional signs shall be installed to guide the persons with disabilities to an accessible entrance.

- It is recommended to have a route maps, bus numbers etc. displayed at the Bus Stop facility as recommended in IRC:70 "Regulation and Control of Mixed Traffic in Urban Areas".

- Bus Stop name shall be written on top of the bus shelters.

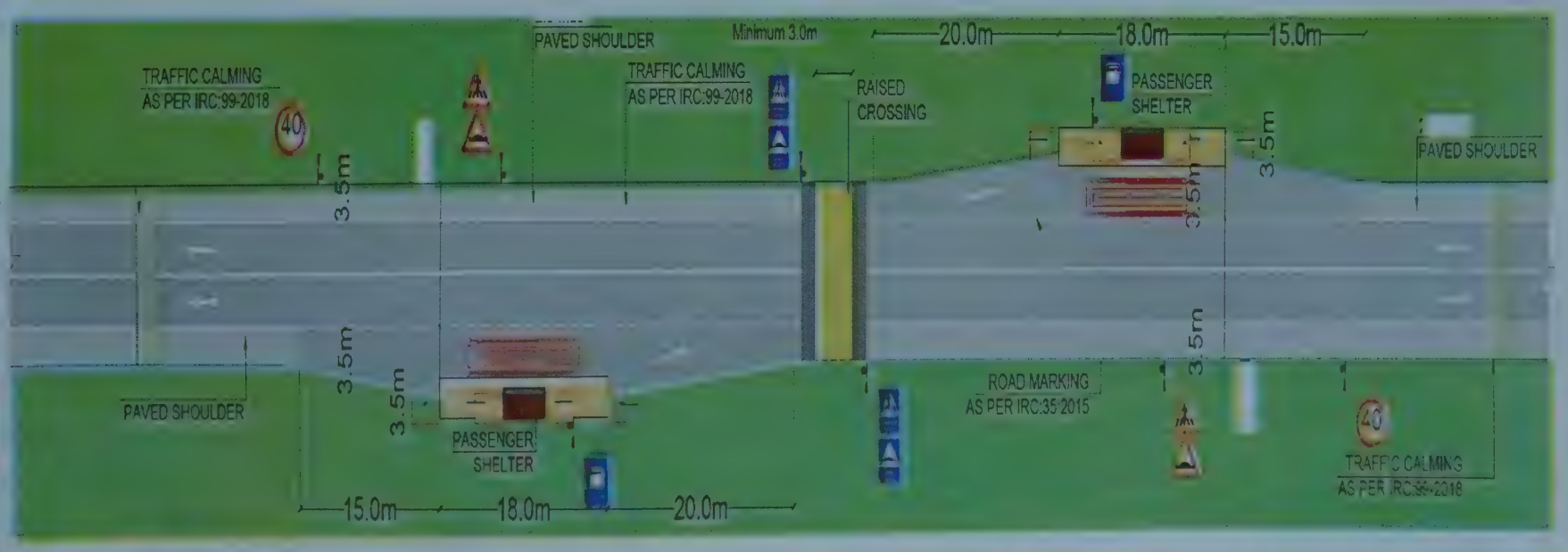

Fig. 11 Road Signs and Markings illustrated for Staggered Bus Stops on 2 Lane Highway

8.3 Pavement markings at the bus stops should be provided with the work 'BUS STOP' written prominently on the pavement. The word message "BUS STOP" shall be repeated in each box of bus bay if more than one bus stop is provided. The line marking shall be white in colour and 100 mm wide.

8.4 Pedestrian crossings should be marked slightly behind the standing position of the buses in order to avoid conflicts. Bus box marking should be provided in front of bus shelters as per IRC:35. Moreover, the kerbs should be marked with continuous yellow line to indicate no parking.

8.5 Bus bay marking should be provided with proper chevron marking and can be either with physical island or ghost island as recommended in IRC:35 "Code of Practice for Road Markings".

8.6 Retro-reflective studs shall be used to supplement longitudinal/transverse reflectorized road marking, to provide improved visibility in night-time and adverse weather conditions.

8.7 Road studs shall also be used across the carriageway to serve as Speed Arrestor coupled with eschewing warning through the creation of the rumble sensation to the user near the bus stop if required.

8.8 Where the facility for exiting traffic are provided from the main carriageway like entry to Bus Bay, green colour stud shall be provided.

8.9 Solar powered road studs are more effective which can immediately draw attention of drivers and shall be provided at locations like approach to road crash prone locations and highly hazardous locations where performance of normal road studs is not that effective due to street lightings and other roadside activities.

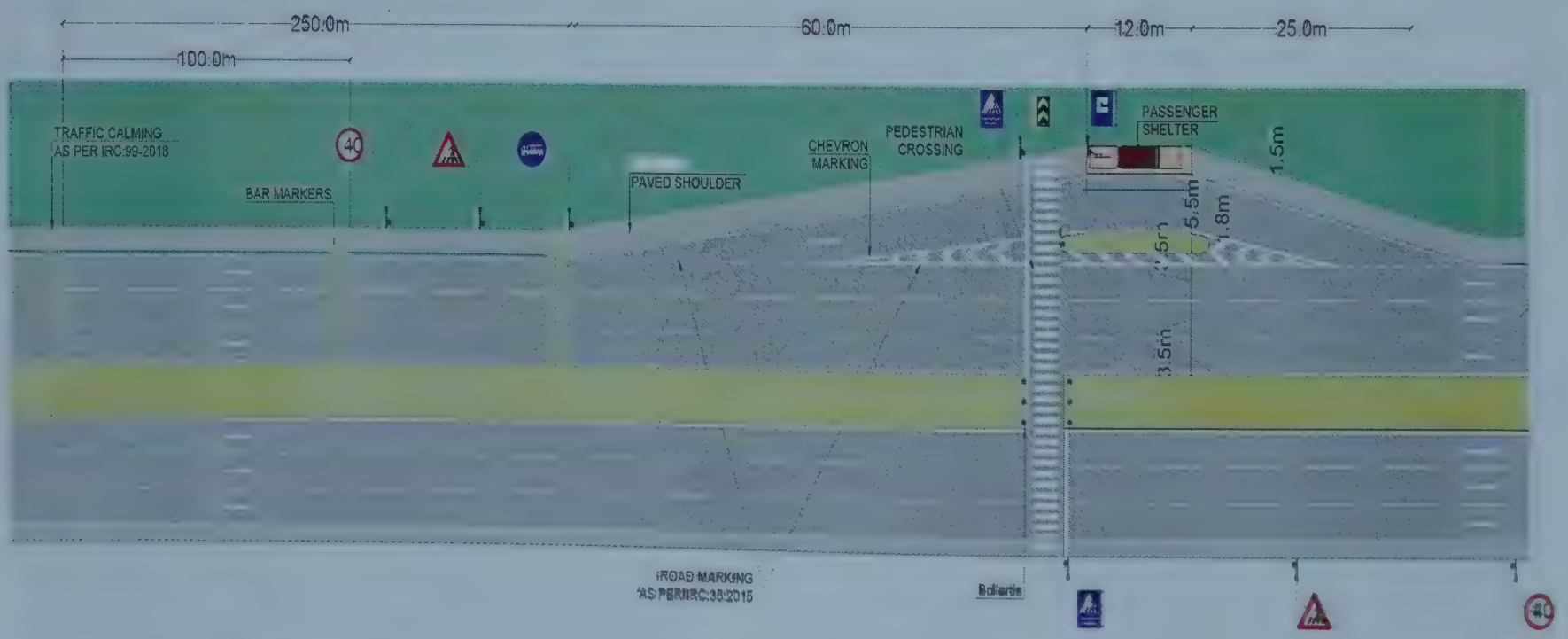

Fig. 12 Road Signs and Markings illustrated for Bus Lay-by on 6 Lane Highway

8.10 The siting of retro-reflective studs and solar studs should be as per IRC:35 "Code of Practice for Road Markings".

8.11 Tubular Markers shall be used in longitudinal direction along with traffic lane line marking, if the traffic is required to be diverted into two different pathways. Tubular Markers are generally used when traffic moves at lower speeds and traffic volumes are relatively high. Tubular Markers should be reflectorized for night visibility. A reference may be made to IRC:SP:55 "Guidelines on Traffic Management in Work Zones" for further details.

8.12 Markings should be maintained regularly.

9. AMENITIES AND TYPICAL BUS STOP DESIGN

9.1 It is recommended that pick-up bus stop on highways having multiple bus bays shall be provided with toilet amenities. With regards to the toilet amenities to be provided at the identified bus stops, a reference shall be made to the Swachh Bharat Mission Guidelines (Urban), 2018. When Unisex accessible public toilets (multi-use toilets) are provided near the bus stop, it shall have international symbol of accessibility displayed outside for wheelchair access as per IRC:SP:117 "Manual on Universal Accessibility for Urban Roads and Streets" along with the toilet facility informatory sign as provided in IRC:67 "Code of Practice for Road Signs". Provision for drinking water may also be accommodated in the design of the bus stop.

9.2 Pedestrian crossing/raised crossings are recommended on 2-lane divided/undivided highways as indicated in layouts. A reference in this regard may be made to IRC:103 "Guidelines for Pedestrian Facilities". It is further recommended to provide a footpath besides paved shoulder from Bus Shelter leading upto the nearest intersection.

9.3 Provision for solar panels and solar powered lighting facilities are recommended at the bus stops. The bus stop and the pedestrian infrastructure should be adequately illuminated, and proper lighting installations should be provided.

9.4 Bus stop and related facilities design should be universally accessible and confirming to provisions for differently abled people including visually impaired. In this regard a reference may be made to IRC:103 "Guidelines for Pedestrian Facilities".

9.5 Typical bus stop design is provided in **Fig. 13**. This bus stop may have 4.5 m × 2.5 m plan area. The bus stop platform should be 150 to 180 mm high and the platform or the connecting footpath should be accessible from the road crossing (barrier free) with a ramp of slope no steeper than 1:12 (CPWD Guidelines, 1998, IRC:103). Also, the provision for pedestrian guard rails and handrails should be made. It is recommended that the structure be made using precast concrete elements. The roof may be of corrugated steel on mild steel sections.

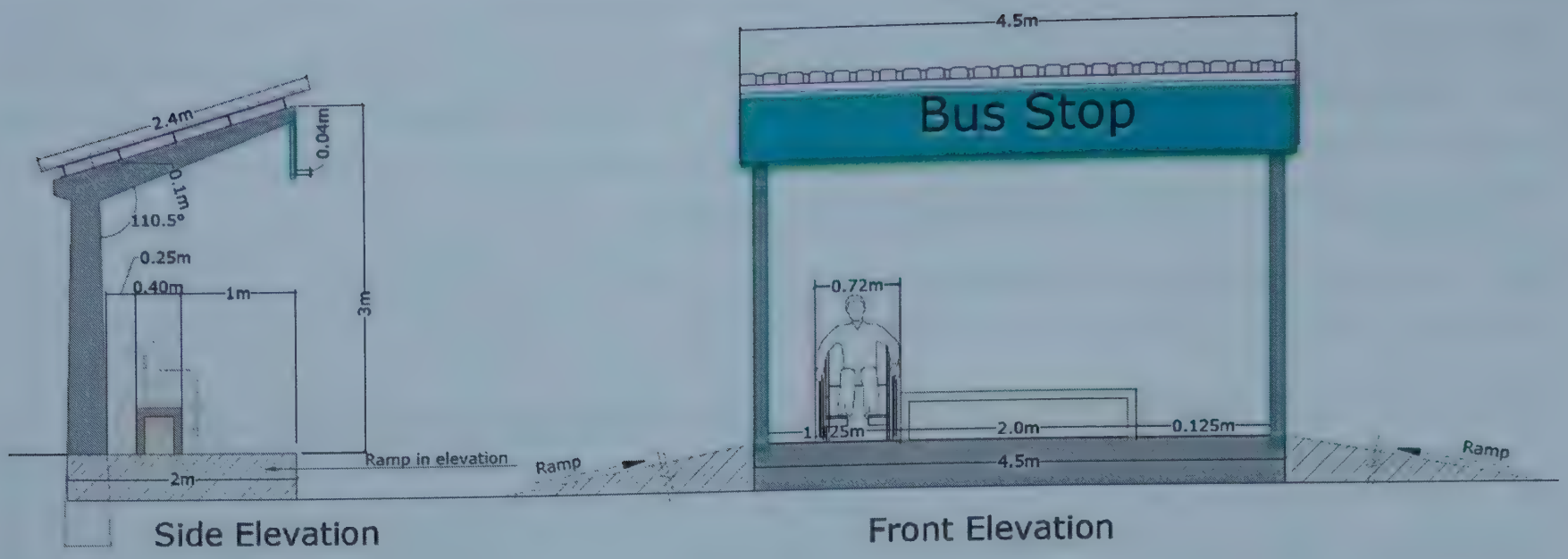

Fig. 13 Illustration of a Typical Bus Stop Design for Rural Highways

REFERENCES

- Bus Stop Design Guide, 2005, Translink, Department of Regional Development, United Kingdom available at https://www.planningni.gov.uk/downloads/busstop-designguide.pdf accessed on 18th Oct 2019
- CPWD. 1998, "Guidelines and Space Standards for Barrier Free Built Environment for Elderly and Disabled Persons", Central Public Works Department, Ministry of Urban Affairs and Employment, Govt. of India
- IRC:35-2015 "Code of Practice for Road Markings" *(Second Revision)*
- IRC:64-1990 "Guidelines for Capacity of Roads in Rural Areas" *(First Revision)*
- IRC:67-2012 "Code of Practice for Road Signs" *(Third Revision)*
- IRC:70-2017 "Guidelines on Regulation and Control of Mixed Traffic in Urban Areas" *(First Revision)*
- IRC:79-2019 "Recommended Practice for Road Delineators" *(First Revision)*
- IRC:99-2018 "Guidelines for Traffic Calming Measures in Urban and Rural Areas" *(First Revision)*
- IRC:103-2012 "Guidelines for Pedestrian Facilities" *(First Revision)*
- IRC:SP:42-2014 "Guidelines on Road Drainage" *(First Revision)*
- IRC:SP:55-2014 "Guidelines on Traffic Management in Work Zones" *(First Revision)*
- IRC:SP:73-2018 "Manual of Specifications & Standards for Two Laning of Highways with Paved Shoulders" *(Second Revision)*
- IRC:SP:84-2019 "Manual of Specifications & Standards for Four Laning of Highways" *(Second Revision)*
- IRC:SP:87-2019 "Manual of Specifications & Standards for Six Laning of Highways" *(Second Revision)*
- IRC:SP:117-2018 "Manual on Universal Accessibility for Urban Roads and Streets"

- Swachh Bharat Mission (Urban) 2018, "Advisory on Public and Community Toilet", Ministry of Housing and Urban Affairs, Govt. of India

- TCRP Report 19, 2014, "Guidelines for the Location and Design of Bus Stops" (Part B) available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_19-b.pdf accessed on 01 Sep 2019

(The Official amendments to this document would be published by the IRC in its periodical, 'Indian Highways' which shall be considered as effective and as part of the Code/Guidelines/Manual, etc. from the date specified therein)

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